REMARKS:

Claims 1, 3 and 6-15 are currently pending. Claim 14 is amended.

Specification

The Examiner objected to Claim 14 because while said Claim recites butyl chloride as the lowest boiling fraction, in the drawings it is shown to be the top component. "Lowest-boiling fraction" is the fraction that boils as the lowest temperature, and such fraction would come off the top of the distillation column. Nonetheless, Claim 14 has been amended for clarity and favorable action is solicited.

Rejections under 35 USC § 103

Claims 1-10 are rejected for allegedly being unpatentable in over US 4,204,915 in view of Van Winkle (Distillation, McGraw Hill, 1967)(hereinafter "Van Winkle").

To establish *prima facie* obviousness, the examiner must show in the prior art some suggestion or motivation to make the claimed invention, a reasonable expectation for success in doing so, and a teaching or suggestion of each claim element (*see, e.g., In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ 2d 1941 (Fed. Cir. 1992); *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986); *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)).

The Examiner has failed to meet these burdens.

US 4,204,915 teaches a process for separating a compound from water. For one of ordinary skill in the art to practice said separation, the mixture of compound and water is distilled in the presence of an entrainer, whereby said entrainer forms an azeotropic mixture with water. The azeotropic mixture of water and entrainer is distilled off from the top of a fractionation column, while the dehydrated, or at least concentrated, desired compound is withdrawn from the bottom of said column. In the preferred embodiment of US 4,204,915, the desired compound is acetic acid. Acetic acid is separated from water and entrainer and said entrainer is butyl acetate. The Examiner is directed to the fact that in the cited system, neither acetic acid and water (which correspond to components A and B of the instant invention) nor do butyl acetate (which corresponds to the auxiliary H of the instant invention) and acetic acid form an azeotrope with one another. The art taught by US 4,204,915 is one of separating liquids

having close boiling points rather than that of azeotropes. The entrainer of the cited art is simply used for removing the undesired water by the formation of a relatively low-boiling azeotrope. Moreover, column 3 lines 24-26 of the cited art shows that from the bottom of the column, dehydrated acetic acid (pure acetic acid) or a concentrated acetic acid (acetic acid plus a reduced amount of water) is obtained. Thus, it is abundantly clear that the resulting bottom product is a mixture of acetic acid with the entrainer. This can also be seen in example 1, wherein the resulting bottom product is a mixture of 93.3% by weight of acetic acid and 6.7% by weight of water (100% total; *i.e.* no butyl acetate; *See* column 5, lines 11-16).

In contrast thereto, the instant invention teaches a process for separating a liquid mixture of at least two components, A and B, which form an azeotrope (AB). Said mixture is distilled in the presence of an auxiliary H, which with each of the two components A and B, forms binary azeotropes AH **and** BH having boiling points lower than that of H, and is also able to form a ternary azeotrope with the components A and B. AH and BH fractions are isolated wherein each is depleted in its respective A or B component and at least part of the H is introduced from the top and/or in the upper region of a distillation column.

Accordingly, the process of the instant invention differs from that of US 4,204,915 by at least the following; 1) in instant invention, A and B form an azeotrope with one another, whereas in US 4,204,915, acetic acid and water clearly do not form an azeotrope; 2) in the instant invention, both components A and B form a binary azeotrope with H, whereas in US 4,204,915, acetic acid definitely does not form an azeotrope with butyl acetate; 3) US 4,204,915 fails to teach whether the boiling point of the butyl acetate/water-azeotrope is lower than that of butyl acetate; and 4) in the instant invention, H is additionally able to form a ternary azeotrope with the components A and B, whereas in US 4,204,915, acetic acid, water and butyl acetate do not form a ternary azeotrope. Although this might be assumed from the statements in column 4, lines 34-40, the expression "form a ternary azeotropic system of acetic acid-water-butyl acetate" would mean that the three components are a ternary mixture to one of ordinary skill in the art. Therefore, US 4,204,915 teaches a completely different system than does the instant invention. Accordingly, one of ordinary skill in the art would not be motivated to practice the cited invention all the while expecting success when attempting to practice the instant invention because of the aforementioned dissimilar art teachings.

Moreover, the deficiencies of US 4,204,915 are not remedied by Van Winkle because

said reference is simply a classification of the possibilities for the separation of a mixture of compounds having a minimum boiling azeotrope point. More precisely, the first alternative refers to a system wherein an entrainer is used which forms a binary minimum azeotrope boiling at a lower temperature than the original (b.p. (HA) < b.p. (AB)). The second alternative refers to a system, wherein the entrainer forms a ternary minimum azeotrope boiling at a lower temperature than the binary azeotrope (b.p. (HAB) < b.p. (AB)). The instant invention, wherein b.p. (HA) and b.p. (HB) < b.p. (H), is not taught ("b.p." boiling point). Accordingly, the claimed subject matter is not obvious to one of ordinary skill in the art in light of US 4,204,915 in view of Van Winkle.

Furthermore, the Examiner is directed to the fact that US 3,733,218 fails to disclose replacing the acetic acid/water system with a chlorinated ethylene/alcohol mixture. Also, said cited art replaces the butyl alcohol of US 4,204,915 with water for employment as an entrainer. Moreover, US 3,733,218 teaches the use of azeotropic mixtures of chlorinated ethylene/alcohols for removing residual rosin flux material from a printed circuit boards. The advantage of using an azeotropic mixture as a solvent for cleaning the circuit boards is stated to be the uniformity of the composition and the ease of recovery, since azeotropic mixtures have a definite boiling point and a definite composition (cf. column 1, line 45-55). Thusly, US 3,733,218 does not teach the separation of an azeotropic mixture, since said separation would render the process described therein, cleaning, ineffectual. It is exactly the characteristic of azeotropes, i.e. their non separability by simple distillation/rectification which is useful for the invention of US 3,733,218. Accordingly, one of ordinary skill in the art would not have had any motivation to employ the solvent system of US 3,733,218 in the procedure of US 4,204,915.

For at least the reasons expressed above, it is urged that the prior art reference cited by the Examiner fails to suggest the present invention as defined by the Claims. Accordingly, the rejections under 35 USC § 103 should be withdrawn. Favorable action is solicited.